Articles

Recent and Emerging Trends in Undergraduate Medical Education
Curricular Responses to a Rapidly Changing Health Care System

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Changes in the financing and delivery of health care, most notably the growth of managed care, are demanding physicians with knowledge, skills, and attitudes vastly different from the typical graduate of our nation's medical schools (Table 1).[1] Compared with physicians in traditional fee-for-service practice, physicians practicing in managed care settings provide more ambulatory care and less inpatient care, and they face new pressures to practice cost-effectively and to work in interdisciplinary teams; they must deal with new forms of payment and administrative controls and are required to think about maintaining the health of populations rather than individual patients.[2] The Pew Health Professions Commission, a national body of leaders in allied health, dentistry, health care administration, medicine, nursing, pharmacy, public health, and the health care delivery system, has identified a core set of competencies that all health professionals ought to possess if they are to meet the health needs of the public in the next century (Table 2).[3] Other influential bodies in both the public and private sectors have embraced these competencies and incorporated them into their own recommendations for change in educational processes, curricula, and institutional mission.

Representatives of managed care organizations have also articulated competencies that they believe future physicians will need to practice effectively in a managed care setting.[4] These organizations have recommended that medical education include such topics as the organization and financing of health care; resource allocation and risk management; quantitative methods related to the health of populations, such as epidemiology, biostatistics, and decision analysis; health services research skills; computer applications and medical informatics; social and behavioral sciences; and medical ethics. Some of these topics have appeared in previous calls for reform in medical education.[5] Furthermore, managers of

managed care organizations estimate it takes one to two years of additional experience to prepare recent graduates for practice in a managed care environment.[6]

Still other medical educators and policymakers have emphasized the need for new physician skills to continuously improve health.[7] Headrick and colleagues argue that "to the basic sciences of anatomy, physiology, and biochemistry, add epidemiology, statistics, medical decision making, economic, psychology, and ethics. To the effective treatment of disease in individual patients, add the maintenance of healthy lives in large populations. To current professional skills, add management and interdisciplinary team skills that allow the [physician] to function effectively in the system that is the new healthcare setting." Such a setting requires knowledge for improvement, as delineated by "continuous quality improvement (CQI)" Drawing from the literature on CQI in health care,[8] the authors articulate the new clinical skills needed to improve health (Table 3).

The views of practicing physicians themselves are consistent with these observations and recommendations. Recent studies indicate that practicing health professionals point to deficiencies in their training in such critical areas as responding to the needs of different cultural and ethnic groups, understanding and supporting the role of community service agencies, and ensuring access to quality health care for all segments of the population.[9,10] In 1991, a telephone survey of physicians found that more than half thought that 12 of the 16 Pew Health Professions Commission competencies were "very important" to include in undergraduate training. In rating their own training, a majority felt that their training was only "fair" or "poor" regarding the involvement of patients and their families, evaluation of the appropriateness of costly technology, consideration of cost implications in their decision making, and understanding and supporting the community's role in health care. Forty percent or more felt poorly

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ABBREVIATIONS USED IN TEXT
CQI = continuous quality improvement
HMO = health maintenance organization
PBL = problem-based learning

TABLE 1.—*Characteristics of the Emerging Health Care System*

Orientation toward health	Constrained resources
Population perspective	Coordination of services
Intensive use of information	Reconsideration of human values
Focus on the consumer	Expectations of accountability
Knowledge of treatment outcomes	Growing interdependence

prepared to work in managed care settings or to accommodate increasing external scrutiny.

Physician competence for future practice will be difficult to achieve in the current medical education environment, which emphasizes the care of individual patients in specialized inpatient settings. Education and training in these competencies must be balanced with the individual, organ-based, and disease-specific model that has been the predominant driving force in medical education for several decades. To this end, more medical schools are experimenting with their curriculum to better equip their graduates for future practice. The purpose of this article is to review new and emerging curricular trends in undergraduate medical education in order to inform the strategic planning efforts of medical schools.

Recent and Emerging Curricular Trends in Undergraduate Medical Education

The section below reviews a number of recent and emerging curricular trends in undergraduate medical education. In some cases, these curricular changes are due to legislative mandates, market pressures, the receipt of external funding, student demand, or a growing evidence base in support of change. During the past decade, a number of private and public funders have made significant investments in health professions education reform. A listing of national initiatives that includes medical schools as grantees is given in the appendix.

Competency-Based Curricula

Considerable experimentation with competency-based systems for instruction has occurred during the past two decades.[11] A few medical schools now use this approach to organize their educational program around learning objectives that are communicated clearly to students before instruction and that are used as the basis for evaluating their students' performance.[12] A 1990 survey of medical schools, however, revealed that for most schools, a mission statement is the only indication of the curriculum's purpose.[13] Only 16 schools reported that they have defined knowledge and skills for their medical education programs. Of those schools, two have adopted objectives that graduating students must meet. Brown University Program in Medicine has recently completed a curriculum reform effort that led to a competency-based curriculum that sets benchmarks and standards that each student must attain before graduation.

Several strategies seem to be necessary to define the knowledge and skills for students' entire education program and to move forward in developing a competency-

based curriculum.[14] Schools must provide administrative mechanisms to enable faculty across disciplines and across the curriculum to consult with each other on what should be included in medical education. Describing the exit objectives that students must achieve to graduate is a strategy to bring about interdisciplinary discussion and action.

Self-Directed Learning

There have been many calls to decrease the use of the didactic lecture method in medical education and to increase student self-directed learning. In the 1993-1994 Liaison Committee on Medical Education annual medical school questionnaire, an item asked how schools made use of several instructional formats.[15] The use of active-learning formats has increased but differs in degree among schools. Small-group teaching is used as a major format in almost half of all schools, but computer-assisted and self-instruction are mainly used as a minor part of one or a few courses. Sixty-eight schools reported that they used self-instruction only as a minor part of one or more courses, 24 schools used the format as a major part of numerous courses of a curriculum track or segment, and 4 schools did not use the format.

The use of computers is another way to increase active learning opportunities for students. For computer-assisted instruction, 70 schools used the format as a minor part of one or more course, 19 schools as a major part of many courses or a curricular track or segment,

TABLE 2.—*Health Practitioner Competencies for 2005*

Care for the community's health	Assess and use technology appropriately
Expand access to effective care	Improve the health care system
Provide contemporary clinic care	Manage information
Emphasize primary care	Understand role of physical environment
Participate in coordinated care	Provide counseling on ethical issues
Ensure cost-effective and appropriate care	Accommodate expanded accountability
Practice prevention	Participate in a culturally diverse society
Involve patients/family in decision making	Continue to learn
Promote healthy lifestyles	

TABLE 3.—*New Clinical Skills of Continuous Quality Improvement*

The ability to perceive and work effectively in interdependencies

The ability to work in teams

The ability to understand work as a process

Skill in collecting, aggregating, analyzing, and displaying data on outcomes of care

Skills in "designing" health practices

Skill in collecting, aggregating, analyzing and displaying data on processes of work

Skills in collaborative exchange with patients

Skills in working collaboratively with lay managers

and three schools did not use the format. The Liaison Committee on Medical Education found that 121 schools are using computer-based instructional programs as study aids for students and 102 schools require computer-based instructional programs as part of one or more courses. Seventy-three schools use computer-based simulations to teach or evaluate diagnostic or therapeutic decision making. Some medical educators have observed that the promise of computers in medical education has not been realized.[16,17] Koschmann contends that exposing medical students early in their training to electronic information resources will result in physicians who have a different orientation toward knowledge and learning. He recommends three different approaches to computer literacy training: learning about computers, learning through computers (that is, using computers as tools for instructional delivery), and learning with computers (that is, requiring students to use computers in their work on a day-to-day basis).

Problem-Based Learning

By far the majority of medical schools focus on problem-based tutorial learning as the way to promote and teach students to be self-directed learners. A recent survey indicates that 21 medical schools have moved or are moving to a self-directed, problem-based mode of teaching and learning in the medical school curriculum.[18] Many schools have adopted problem-based learning to bridge the gap between the preclinical and clinical undergraduate curriculum. Some schools have replaced the entire first two years of basic science training, whereas others have included problem-based learning in a modified didactic curriculum.[19,20] The evidence for problem-based learning (PBL) in the clinical years is less well documented.[21]

Pioneered at McMaster University Medical School, PBL is best defined as "the learning that results from the process of working toward the understanding or resolution of a problem." The problem is encountered first in the learning process and serves as a focus or stimulus for the application of problem-solving or reasoning skills, as well as for the search for or study of information or knowledge needed to understand the mechanisms

responsible for the problem and how it might be resolved. Students in the problem-based learning method analyze carefully written clinical cases in tutorial groups facilitated by a faculty leader.[22] The students discuss the case, hypothesize about what is going on, and identify learning tasks for independent study. In follow-up tutorial sessions, students return to discuss what they have learned and to reformulate their learning objectives for another round of independent study. In this cycle, the tutorial serves as a forum for analyzing the case, setting learning agenda, discussing and elaborating on what students learned during independent study, and refining and elaborating their knowledge. This approach, based on adult learning theory, casts the student in the role of an active, responsible participant in the education process.

The effects of problem-based learning were examined by conducting a meta-analysis–type review of the English-language international literature from 1972 to 1992.[23] Compared with conventional instruction, PBL, as suggested by the findings, is more nurturing and enjoyable; PBL graduates perform as well, and sometimes better, on clinical examinations and faculty evaluations; and they are more likely to enter family medicine. Furthermore, faculty tend to enjoy teaching using PBL. However, PBL students in a few instances scored lower on basic sciences examinations and viewed themselves as less well prepared in the basic sciences than were their conventionally trained counterparts. Problem-based learning graduates tended to engage in backward reasoning rather than the forward reasoning experts engage in, and there appeared to be gaps in their cognitive knowledge base that could affect practice outcomes. The costs of PBL may slow its implementation in schools with class sizes larger than 100. While weaknesses in the criteria used to assess the outcomes of PBL and general weaknesses in study design limit the confidence one can give conclusions drawn from the literature, the authors recommend that caution be exercised in making comprehensive, curriculum-wide conversions to PBL until more is learned about (1) the extent to which faculty should direct students throughout medical training, (2) PBL methods that are less costly, (3) cognitive-processing weaknesses shown by PBL students, and (4) the apparent high resource utilization by PBL graduates.

The major constraints to the expansion of PBL in medical education seems to be that faculty members generally resist abandoning the role of being information providers only, in part because giving lectures is the most efficient way for them to provide information.[24] Faculty development is a key ingredient for the success of any curricular innovation and is described in greater detail below.

Ambulatory and Community-Based Education

Educating health professions students in community-based settings holds great promise for preparing health professionals for the realities of future practice. No fewer than six national bodies have recently advocated for expanding health professions education in communi-

ty-based settings.[25-27] Calls for a more population-focused agenda for academic health centers have come from foundation initiatives such as the Health of the Public Program, the W. K. Kellogg Community Partnerships initiative and the Health Professions Schools in Service to the Nation Program and from such bodies as the World Health Organization,[28] the Network of Community-Oriented Educational Institutions for Health Sciences, and the Health Resources and Services Administration. Prominent leaders within academe have articulated a vision for community-based education based on true partnerships between health professions schools and the communities they serve.[29-31]

Proponents of community-based health professions education advance several arguments for the important and unique learning opportunities offered in community-based settings.[32-43] The predominant ones include allowing learners to:

- care for patients seen primarily in outpatient settings—especially patients who have chronic illnesses;
- observe the natural and treated progression of diseases through continuity of care;
- practice health promotion and disease prevention strategies
- develop patient communication and negotiation skills;
- deal with social, financial, and ethical aspects of medical care; and
- increase students' and residents' capabilities and career interests in addressing the relevant health issues of rural and underserved communities.

A growing body of empirical evidence supports the benefits to both physicians-in-training and communities of combining service and learning in community-based settings.[44] Community-based learning contributes to positive changes in trainee attitudes toward diverse populations and disciplines, in knowledge about community resources and the socioeconomic determinants of health, in skills related to teamwork and communication, in decision making about specialty choice and practice location, and in competence for primary care practice. Preliminary evidence from the study of a national demonstration program of service learning in health professions education points to the importance of integrating nonclinical community-based learning into the curriculum: service learning with no clear clinical component appears to be the most personally transforming, as trainees learn to see people as "people" and not solely as "patients."[45] Communities also benefit from their involvement in community-based learning. Community-based organizations report increased access to care for their clients, enhanced prestige of their organization, greater success in staff recruitment and retention, and increased staff professional satisfaction as the most significant benefits gained by their participation in health professions education.

Ambulatory- and community-based education is a growing emphasis in medical education. In 1995, 35 schools (up from 22 in 1993) offered a required ambulatory experience in the first year of the curriculum taught by fulltime primary care clinical faculty, and 34 (up from 20 in 1993) schools offered this type of experience in the second year. Also, 56 schools (up from 32 in 1993) offered a required ambulatory experience taught by volunteer, community-based primary care physicians in the first year, and 40 (up from 28 in 1993) offered this experience in the second year.

During the 1995–1996 school year, the vast majority of medical schools included experiences with volunteer faculty members in ambulatory, community-based non-hospital settings. Of the 124 schools responding to the annual Liaison Committee on Medical Education questionnaire in 1996, 86 (69%) used this setting as part of the family practice clerkship, 44 (25%) as part of the pediatrics clerkship, 47 (40%) as part of the internal medicine clerkship, 24 (19%) as part of the obstetrics-gynecology clerkship, 17 (14%) as part of the surgery clerkship, and 15 (12%) as part of the psychiatry clerkship. Only 22 schools (17%) reported that their students were not involved in an ambulatory, community-based setting as part of a course to teach clinical skills.

The average amount of time that students spent in the outpatient setting during the required clerkships in the 1994–1995 academic year was 95% in family practice, 39% in pediatrics, 30% in obstetrics-gynecology, 22% in internal medicine, 21% in psychiatry, and 16% in surgery. All are slight increases from the previous year. The number of schools with a required family practice clerkship has increased steadily: 67 in 1990, 72 in 1991, 80 in 1992, 85 in 1993, and 87 in 1994. In 1994, 36 schools had one or more required rotations in rural settings, and 33 schools had a required rotation in an urban underserved setting.

The Liaison Committee on Medical Education recently surveyed medical schools to assess their extent of community-based education.[46] All of the 51 responding medical schools had some type of community-based, ambulatory care experiences. The percentage of students participating in a given course or clerkship varied from 10% to 100%. In 15 schools, there were courses or clerkships where all students spent time in that setting. In general, there were two goals for experiences that occurred in the first or second year of medical school. Thirty schools had required family practice clerkships; more than half of these clerkships placed all students in community-based sites. A recent survey of medical schools examined the educational linkages between medical schools and public health agencies. Of the 108 respondents, 68 (63%) report having a program that places some or all students at public health agencies.[47]

Managed care organizations are increasingly being used as sites for ambulatory medical education. In 1995, 18 medical schools reported that all students spent time in a managed care organization at some time during the curriculum; in 60 schools, some students

trained in managed care organizations. In 1995 and 1996, an average of 16% of schools required all students to have clerkships or other clinical experiences in a group or staff model health maintenance organization (HMO), and some students from another 46% of schools spent time in an HMO for clerkships or physical diagnosis or Introduction to Clinical Medicine courses. About 85% of schools potentially exposed students to other types of managed care during one or more required clinical experiences in ambulatory, community-based settings. Whether these experiences in managed care settings help students to develop competencies for future practice in a managed care environment has not been demonstrated. While the feasibility of medical education in nonprofit group or staff model HMOs is well documented, it is not certain whether these models can be adapted to for-profit managed care settings.[48]

A recurrent theme among health professions educators has been a concern that students receive comparable clinical and educational experiences across varied training sites, particularly when comparing community- and university-based sites.[49] A recent literature review on teaching and learning in ambulatory medical education included 15 studies of the types and frequencies of patient problems encountered in ambulatory care clinics.[50] The majority of studies used student logs as the data collection method. These studies largely confirm that students encounter patient problems at rates similar to national norms for ambulatory visits in particular disciplines. Eight studies examined the comparability of clinical experiences across sites, such as university outpatient clinics, community clinics, and private practice clinics. The overall clinical experiences of students across sites were generally comparable. However, students in community clinics saw more patients and did more procedures than students in residency-based clinics, and residents in private practice offices saw more patients and a greater variety of types of patient problems than those in university clinics.

Parkerson and Baker studied 15 second-, third-, and fourth-year medical students in clinical preceptorships, with 14 in a university medical center.[51] Eight of the 22 most frequent problems were similar across settings: medical examination, diabetes mellitus, and otitis media. Students in the preceptors' offices saw a higher frequency of certain problems, such as acute infections, lacerations, prenatal care, obesity, and hypertension. Schwiebert and Davis studied 64 third-year medical students on their family medicine clerkships at 18 community clinic sites.[52] Sixty-nine percent of students encountered 20/27 core patient problems in family practice. The same investigators studied 185 third-year medical students to compare students' experiences in university and private practice sites during their family medicine clerkships.[53] Students had comparable experiences in number and types of problems encountered across settings for 20 core problems.

Using data from student logbook records of their clinical encounters, the University of Washington School of Medicine compared the learning experiences of 68 third-year medical students assigned to either community- or residency-based clinics for their family medicine clerkship. National Ambulatory Medical Care Survey data were used to compare student experiences with national practices.[54] Log data documented that both community practices and residency sites met the course curriculum goals. Some variations occurred between the two types of clerkship sites, however. Students at community practices saw a higher mean number of patients and did more procedures than students at residency sites. Students at residencies were more likely to see patients for health maintenance and pregnancy care and less likely to see lacerations, sprains or strains, and some chronic diseases.

At a time when policy makers and citizens expect increased accountability and community responsiveness of publicly funded institutions, health professional schools need to pay particular attention to the nature of their community relationships and the potential community-based learning has not only for educating students but for concurrently addressing unmet community needs.[55] The transition from viewing the community as "learning laboratory" to engaging the community as "partner" is not an easy one.[56] The Johnson Foundation's ten "Principles of Good Practice for Combining Service and Learning" are a good set of initial guiding principles for effective community-based learning.[57] Although not specifically developed for a particular discipline or set of disciplines, these principles can inform the development of community-based learning in the health professions that is responsive and accountable to communities:

1. Engage people in responsible and challenging actions for the common good.
2. Provide structured opportunities for people to reflect critically on their service experience.
3. Articulate clear service and learning goals for everyone involved.
4. Allow for those with needs to define those with needs.
5. Clarify the responsibilities of each person and organization involved.
6. Match service providers and service needs through a process that recognizes changing circumstances.
7. Expect genuine, active, and sustained organizational commitment.
8. Include training, supervision, monitoring, support, recognition, and evaluation to meet service and learning goals.
9. Ensure that the time commitment for service and learning is flexible, appropriate, and in the best interest of all involved
10. Commit to program participation by and with diverse populations.

Continuous Quality Improvement

Efforts to teach medical students how to improve quality in health care are just beginning. A recent survey medical schools' current interest and activity in quality improvement found that 18 of the 105 respondents discuss CQI in the medical student curriculum, and it is most commonly mentioned in preclinical lectures about health policy and quality of care (L.A. Headrick, D. Neuhauser: "Teaching CQI/TQM in American Medical Schools," unpublished data [June 1996]). A total of 55 schools stated that CQI is used somewhere in the medical school environment. In all, 97 schools indicated an interest in the concepts of CQI.

A few schools have implemented CQI components into the clinical curriculum. In the fourth-year primary care core clerkship at Case Western Reserve University School of Medicine in Cleveland, for instance, CQI is the framework for a student project on the quality and cost of asthma care.[58] Knowledge and practical applications of CQI are also included in the school's new primary care track. Other CQI programs are in place at St Louis University School of Medicine, St Louis, Missouri, and the Allegheny University of the Health Sciences in Philadelphia. Early lessons regarding CQI in medical education include the following:

- Learning about CQI is most effective in the context of meaningful clinical care, not the classroom.
- Emphasis should be on three basic questions: Why do we do what we do? How do we know it works? How can we do it better?
- The main priority should be on the needs of those we serve.
- Working as part of an interdisciplinary team is best learned during training, not after.
- The best learning environment for CQI is one that is continuously improving itself.

Interdisciplinary Education

Although there have been numerous calls for interdisciplinary education in the health professions, in reality, very little of it is taking place. It has been a challenge to even achieve interdisciplinary collaboration among the disciplines of medicine. The Interdisciplinary Generalist Curriculum Project was initiated recently to encourage medical schools to implement interdisciplinary generalist curricula involving the specialties of family medicine, internal medicine, and pediatrics.[59] Several medical schools have combined components of the basic science curriculum across health professions disciplines, most notably with dentistry and pharmacy.

In addition to the Interdisciplinary Generalist Curriculum Project, other national initiatives that are attempting interdisciplinary education are listed in the appendix to this article. One initiative, the Health Professions Schools in Service to the Nation Program, recently reported on the lessons learned by its grantees[60]:

- *Logistics and communication.* Structured team meetings with specific outcomes will shape the success of interdisciplinary programs. Interdisciplinary team efforts occur over many years; a plan of action with specific goals and objectives will also determine the efficacy of an interdisciplinary project. One program director has created "meeting parking places," which identifies a time for every month when all key players can meet. In addition, they have created an electronic mail list server to facilitate communication between program advisory members.
- *Team development.* Interdisciplinary team spirit is critical for the success of a project. All key stakeholders, such as faculty, students, and community partners, must feel that they have a stake in the program's design and implementation. In order to maintain a cohesive and productive group, programs have included team-building exercises into their meetings involving a diverse group of faculty and students from different disciplines. Team development activities will break down professional barriers and help students and faculty learn more about the different professional cultures and disciplines.
- *Flexibility.* It is important to remain flexible in the development of an interdisciplinary program. Interdisciplinary programs develop over a long period of time with modifications throughout the development process. Faculty are exploring "new territory" in many instances. The unfamiliarity to new environments and educational practices requires an open mind, a sense of adventure, and a tolerance for imperfection.

Methods of Student Assessment

Medical schools are increasingly using alternative methods of assessment to pen-and-paper test taking. The use of standardized patients has been advocated to introduce consistency into the clinical evaluation process and to supplement evaluations performed by faculty members and house staff. In 76 schools, standardized patients are used in evaluation during a course in which interviewing and physical examination skills were taught, and in 69 of these schools, the results from these evaluations are considered in decisions about student progress. In 53 schools, standardized patients are used in clinical clerkship examinations, and in all cases these results were used as part of progress decisions. Multiple station examinations, with or without standardized patients, are used by 49 schools during the introduction to clinical medicine course, in 52 schools during one or more clinical clerkships, and in 39 schools in a final comprehensive examination. Computer simulation was used for assessment during the Introduction to Clinical Medicine course in 20 schools, during clinical clerkships in 42 schools, and during a final comprehensive examination in 9 schools.

In general, standardized patients are used less widely in the evaluation of medical students than of the instruction. However, 15 years of research on the evaluation of clinical competence support the recommendation to use multiple standardized patients as an adjunct to current

evaluation methods. Standardized patient–based examinations will be most useful in courses that teach interviewing and physical diagnosis, in individual clerkships, and in comprehensive examinations after all required clinical training, such as at the end of the third or fourth year of medical school.[61]

Faculty Development

Hellyer and Boschmann's 1993 study of faculty development at 94 institutions made several observations about trends in faculty development and components of successful programs[62]:

Resource centers, along with workshops and individual consultations, are among the most common features of faculty development programs. A resource center can provide books, videos, computer terminals, and reports covering topics related to curriculum development and implementation. While some faculty will come to a center just to browse, many more will appreciate guidance in identifying the most useful journals and being given articles selectively.

Publications can promote curricular innovations. Newsletters can provide "how-to" and theoretical articles on teaching, highlight the work of faculty, and alert faculty to opportunities for forums and faculty development events. Newsletters can also be a means of two-way communication by including forms for faculty to request additional information or submit suggestions for future services. Publications may be just as important for creating and maintaining interest among faculty as they are for disseminating specific content. A letter sent to faculty member on a regular basis listing the services available might be the most productive publication for the amount of effort that is involved.

Consultative services are provided when individual faculty members seek help on their own initiative. Faculty members rarely talk to each other about their teaching. They are most likely to come in for a consultation when they are initiating a new course or new activity within a course or when they feel something is not going right in a current course. They need a sounding board. Consultation is most helpful when consultants are responsive to the faculty's agenda and do not try to impose one of their own. Faculty who seek individual consultations consider them useful and worth the time and effort.

Workshops or seminars are common faculty development tools. Workshops are most effective when they are practical and reflect faculty needs. Faculty input can improve the worth of the seminar. However, the most useful aspect of a workshop may not be the content. The most important message may be "Come down to see us." We should not expect 1-1/2–hour or even one-day workshops to change faculty behavior. Workshops whet the appetite for more information and involvement. More intensive one-on-one consultation is usually needed to effect significant change. Even more important may be the opportunity workshops provide faculty to make connections with their colleagues and to learn they are not alone in what

they are doing. Consequently, it is important in planning workshops and seminars to allow generous time for breaks so that these relationships can develop.

Since workshops are usually insufficient by themselves to induce change, follow-up activities should be considered. One of the easiest is a postworkshop questionnaire to find out if faculty have other needs or if they used any information from the workshop. E-mail is a particularly good medium for this type of questionnaire because it provides an informal and easy means of response. Similarly, support networks are essential and with electronic mail do not have to be local.

Inventories of faculty interest are another way to foster networking among faculty. A directory can be developed, including such information as courses taught and types of course activities. The directory might be distributed in hard copy, but if put on a World Wide Web site or a "listserv," it could be updated more easily. The inventories can range from simple databases to complicated ones that require computer and information specialists as consultants.

Individual interviews are an effective way to get faculty members to think more broadly. Faculty identified in an inventory of faculty interest are a starting point for such interviews.

Some faculty benefit from being encouraged to participate in faculty development or campus committees relating primarily to academic rather than health affairs. Faculty members who are just becoming involved in curriculum reforms benefit from the chance to feel part of a larger endeavor and also from the opportunity to refine the distinctions about what may be unique to service learning in the health professions. While involvement in general campus committees may appeal to only a small group of faculty, more faculty are likely to be receptive to being asked to make presentations on these activities to their own departments. The preparation of such presentations may provide as much benefit to the presenter as they do to the intended audience.

In order to affect the behavior of the faculty, one must be concerned with infrastructure, institutional policies, and procedures. Without attention from the top leadership to policies and procedures, the impact of faculty development may be weakened if not squelched.

The recent project of the Association of American Colleges, "Assessing Change in Medical Education: The Road to Implementation,"[13] indicates that during the past decade, some medical schools have devoted attention to the importance of teaching. Most of the schools acknowledge that more attention should be paid to the teaching activities of faculty members, and some have added teaching accomplishments to the criteria for promotion and tenure decisions. A comprehensive system of rewards will maintain faculty participation. The definition of the teaching function may need to be expanded in promotion and tenure criteria to reward excellence in teaching. Funds may need to be reallocated by deans and department chairs to buy faculty time for program development and course coordination. Even small grants can

stimulate a great deal of planning activity. Faculty can use grants to purchase books, hire a teaching assistant, or travel to an educational conference. Vice chancellors, deans, and department chairs can also devise ways to give faculty official recognition for excellent teaching. While awards alone are not sufficient to stimulate faculty change, certificates and cash awards show that the university values teaching.

Numerous studies of the adoption of curricular innovations suggest that the characteristics of the innovation itself, the organization, and the individual adopter interact to facilitate or hinder the process of change.[64,65] The experience of Harvard Medical School in adopting its "New Pathways" curriculum is an instructive one. Faculty development and evaluation programs were found to have contributed significantly to the process of curricular change.[66] As initial planning of the new problem-based learning courses was getting under way, a committee for faculty development was formed to design a concerted effort to bring faculty into the new culture. The committee recommended that faculty skills–training seminars and workshops begin immediately, facilitated by specialist consultants. The program was designed to address the knowledge, skills, and attitudes needed by teachers and included orientation sessions, meetings of the teaching faculty, seminars and workshops, and expert assistance to individual teachers. These activities were coordinated and carried out under the guidance of a professional educator. Several principles were used to design the faculty development program:

- Faculty need to understand the educational philosophy of the new curriculum.[67]
- Learning is more likely to occur when faculty members perceive a need for new information, skills, or attitudes.[68]
- Although large-group workshops are useful for raising consciousness and introducing teaching skills, their most powerful contribution is the opportunity they provide for faculty to work together and learn from one another.[69]
- Intensive teaching-skill development comes through actual participation, accompanied by opportunities for feedback from students, review of videotapes of sessions, or direct observation and feedback by a peer or an educational consultant. Although this is a resource-intensive approach to faculty development, research on skill acquisition suggests that practice and feedback are essential ingredients in the change process.[70]
- Faculty often speak more persuasively to one another than do the most skilled educational consultants. Social learning theory suggests that role models perceived to be of high status are powerful tools for learning.[71]

Conclusion

In this article, contemporary data and recent trends for curricular innovations in medical education are pre-

sented to inform the strategic planning efforts of medical schools. Notable recent changes include a greater emphasis on student-directed and problem-based learning, education in community-based and managed care settings, and education for continuous quality improvement. To date, the rhetoric of interdisciplinary education has gone largely unrealized by medical schools. New directions in student assessment emphasize the assessment of competence in situations that mirror real-life patient interactions. Early and sustained investment in faculty development is a key ingredient for initiating and sustaining curricular reforms in medical education.

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Appendix

National Health Professions Education Reform Initiatives That Include Medical Schools

More information about these initiatives, including grantee program descriptions, curricula and other resource materials, can be obtained by contacting the program office listed.

Health of the Public

Thomas S. Inui, ScM, MD, Director
Jonathan Showstack, MPH, Co-Director
University of California, San Francisco
735 Parnassus Ave
San Francisco, CA 94143-0994
Phone: (415) 476-8907 Fax (415) 476-3429

The Health of the Public program is supported by The Pew Charitable Trusts and The Robert Wood Johnson Foundation, in collaboration with The Rockefeller Foundation. The program seeks to redirect academic health centers toward strategies that address major deficiencies in the health care system. Through the work of more than 33 participating academic health centers across the United States and in Canada, Health of the Public projects are developing innovative approaches for health professions education to meet community needs.

(data as presented to the Commission;
may not reflect current programs)
Charles R. Drew University of Medicine and Science
Columbia University
Dartmouth Medical School
Emory University
Indiana University
Loyola University Chicago
McMaster University
Meharry Medical College
Morehouse School of Medicine
Mount Sinai School of Medicine
Northeastern Ohio Universities College of Medicine
Rush-Presbyterian–St Luke's Medical Center
The Johns Hopkins University
Thomas Jefferson University
Tufts University/South Cove Community Center
University of Chicago
University of Cincinnati
University of Illinois at Chicago
University of Iowa
University of Kansas
University of Medicine and Dentistry of New Jersey
University of Minnesota
University of Missouri-Columbia
University of New Mexico
University of North Carolina–Chapel Hill
University of Pennsylvania
University of Pittsburgh
University of South Carolina
University of Tennessee, Memphis
University of Texas, Medical Branch at Galveston
University of Texas, San Antonio
University of Washington
Wright State University

Interdisciplinary Generalist Curriculum (IGC) Project

Ardis K. Davis, MSW
IGC Project Manager
Phone: (206) 542-1750
E-mail: ardisd7283@aol.com

The IGC is a competitive, national, 6-year demonstration project, funded by the Health Resources and Services Administration, established to determine if interdisciplinary innovations in preclinical curricula can impact students' selection of generalist careers in family medicine, internal medicine or pediatrics. The IGC

innovation intends to expose students to a minimum of 50 hours of curriculum time, at least 50% of which is devoted to a direct supervised clinical experience with a generalist physician preceptor or mentor. Evaluation efforts are directed at assessing the impact of the IGC project within 10 institutions and on career choices of their students over each of 3 funded years.

(data as presented to the Commission;
may not reflect current programs)
Programs funded from 1994–1997:
Eastern Virginia Medical School
Medical College of Ohio
University of Colorado
University of Nebraska
University of Wisconsin
Programs funded from 1995–1998:
Marshall University
Nova Southeastern University College of Osteopathic
    Medicine
University of California, San Francisco
University of Illinois, Chicago
University of Vermont

Area Health Education Center (AHEC)

National AHEC Office
Carol S. Gleich, PhD
Chief, AHEC and Special Programs Branch
Division of Medicine, BHPr
Health Resources and Services Administration
Parklawn Bldg, Rm 9A-27
5600 Fishers Lane
Rockville, MD 20857
Phone: (301) 443-6950, Fax: (301) 443-8890
E-mail: cgleich@hrsa.dhhs.gov

The mission of the AHEC program is to improve the supply and distribution of health care professionals, with an emphasis on primary care, through community-academic educational partnerships, to increase access to quality health care. Thirty-six states are currently part of a national network of 37 AHEC programs. More than 140 community-based AHECs are functioning within these programs, involving thousands of volunteers who serve as advisory board members, preceptors for health professions students and residents, and other roles that support AHEC programs at the local level. Approximately 80 medical schools and 500 other health professions training institutions have participated.

(data as presented to the Commission;
may not reflect current programs)
Albert Einstein College of Medicine
California AHEC System
Cervando Martinez, Jr, MD
Illinois AHEC Program
James H. Quillen College of Medicine
Kirksville College of Osteopathic Medicine
Louisiana State University School of Medicine
Medical College of Georgia
Medical College of Ohio

Medical College of Wisconsin
Medical University of South Carolina
Meharry Medical College
Mercer University School of Medicine
Morehouse School of Medicine
Nova Southeastern University College of Osteopathic
    Medicine
Oklahoma College of Osteopathic Medicine and Surgery
Oregon Health Sciences University
Pennsylvania State College of Medicine
UMDNJ-School of Osteopathic Medicine
University of Arizona
University of Arkansas for Medical Sciences
University of Colorado
University of Florida College of Medicine
University of Hawaii
University of Louisville School of Medicine
University of Maryland, Baltimore
University of Massachusetts Medical School, Worcester
University of Nevada, Reno School of Medicine
University of New England College of Osteopathic
    Medicine
University of New Mexico School of Medicine
University of North Carolina School of Medicine
University of South Alabama
University of Texas Medical Branch
University of Utah Health Science Center
University of Vermont
University of Washington School of Medicine
Virginia Commonwealth University

Kellogg Community Partnerships with Health Professions Education

W.K. Kellogg Foundation
One Michigan Avenue East
Battle Creek, MI 49017-4058 USA
Phone: (616) 968-1611, Fax: (616) 968-0413

In 1991, the W.K. Kellogg Foundation funded a 5-year, $47.5-million initiative to promote the education of primary care practitioners committed to community-based health care. The heart of the initiative was the creation of community partnerships that would bring health professions educators together with communities to reshape the education and training of practitioners. Each of the seven Partnerships was awarded $6 million.

(data as presented to the Commission;
may not reflect current programs)
Atlanta, Georgia (involves Morehouse School of Medicine,
    Georgia State University School of Nursing, Clark
    Atlanta University School of Social Work and
    Department of Allied Health);
Center for Community Health Education Research and
    Service (involves Northeastern University College
    of Nursing and Boston University College of
    Medicine);
Community–University Health Partnerships Michigan
    State University (involves MSU's Colleges of Human
    Medicine, Osteopathic Medicine and Nursing;

Saginaw Valley State University's College of Nursing
    and Allied Health);
East Tennessee State University;
Institute for Border Community Health Education
    (involves University of Texas at El Paso and the Texas
    Tech University Health Sciences Center at El Paso);
Ke Ola O Hawai'i, Inc (involves University of Hawaii's
    Schools of Medicine, Nursing, Public Health and
    Social Work);
West Virginia (involves University System of West
    Virginia).

Robert Wood Johnson Foundation's Generalist Physician Initiative

National Program Office
Jack M. Colwill, MD, Program Director
Phone: (314) 882-1758, Fax: (314) 882-9096
E-mail: jack@fcm.missouri.edu

The Generalist Physician Initiative is a program intended to challenge schools of medicine—in collaboration with state governments, private insurers, health maintenance organizations, hospitals, and community health centers—to increase the supply of generalist physicians. Specifically, the work of the grantees and the partnership they create under the program are intended to: increase the number of graduates entering generalist residency programs, increase the number of practicing generalist physicians, and work toward changing the incentives in the financing of undergraduate and graduate medical education and in physician reimbursement, in order to create a more favorable environment for the production of generalist physicians.

(data as presented to the Commission;
may not reflect current programs)
University of Virginia School of Medicine and Medical
    College of Virginia
University of Massachusetts Medical Center
University of Texas Medical Branch at Galveston
Morehouse School of Medicine
Pennsylvania State University College of Medicine
University of Louisville School of Medicine
Tufts University School of Medicine
Boston University School of Medicine

Learn and Serve America: Higher Education Program

Corporation for National Service
1201 New York Avenue, NW
Washington, DC 20005
Phone: (202) 606-5000, ext 109, Fax: (202) 565-2781
E-mail: hbailey@cns.gov
http://www.cns.gov/learn/html

On September 21, 1993, President Clinton signed the National and Community Service Trust Act to engage Americans in community service. This law helped to create the Learn and Serve America program designed to integrate service and service-learning, into the daily aca-

demic life of students. The purpose of this program is to: address the pressing educational, public safety, environmental and health needs of our communities; increase the number, quality, and sustainability of opportunities for students to serve by strengthening infrastructure and building capacity within and across the nation's institutions of higher education; and enhance students' academic learning and increase their understanding of the social responsibility, ethics and public purpose of their chosen professions. The Learn and Serve America program supports the following medical school grantees.

(data as presented to the Commission;

may not reflect current programs)

Robert Wood Johnson Medical School

Center for Healthy Communities Wright State University

West Virginia University-Robert C. Byrd Health Science Center

East Carolina University School of Medicine

AHEC Program, University of Arkansas for Medical Sciences

Dartmouth Medical School

Health Professions Schools in Service to the Nation Program

Kara Connors, Program Coordinator

UCSF Center for the Health Professions

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San Francisco, CA 94109

Phone: (415) 502-4771, Fax: (415) 476-4113

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http://futurehealth.ucsf.edu/hpsisn.html

The Health Professions Schools in Service to the Nation Program (HPSISN) is a national initiative designed to strengthen partnerships between health professions schools and their communities. A program of the Pew Health Professions Commission and the National Fund for Medical Education, HPSISN receives support from The Pew Charitable Trusts, the Corporation for National Service, and the Health Resources and Services Administration. In April 1995, the HPSISN Program awarded 3-year service-learning grants to 20 health professions schools across the country. The grantees are a diverse group of schools of medicine, dentistry, nursing, pharmacy and public health whose community partners include public schools, community health centers, community development corporations, and social service agencies.

(data as presented to the Commission;

may not reflect current programs)

Georgetown University School of Medicine

Loma Linda University School of Public Health

Northeastern University College of Nursing

Ohio University College of Osteopathic Medicine

Regis University

San Francisco State University School of Nursing

University of Connecticut Health Center

University of Florida School of Medicine

University of Kentucky College of Nursing

University of North Carolina, Chapel Hill School of Medicine

University of Pittsburgh School of Medicine

University of Scranton Department of Nursing

University of Southern California School of Dentistry

University of Utah College of Nursing

University of Utah and Purdue University College of Pharmacy

Virginia Commonwealth University School of Nursing

West Virginia Wesleyan University

University of Illinois-Chicago School of Public Health

George Washington University School of Medicine and George Mason University Schools of Nursing